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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
AIR RESOURCES BOARD

TECHNICAL SUPPORT DOCUMENT FOR
STAFF PROPOSAL REGARDING REDUCTION OF GREENHOUSE GAS EMISSIONS FROM MOTOR VEHICLES

ECONOMIC IMPACTS OF THE CLIMATE CHANGE REGULATIONS

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Economic Impacts of the Climate Change Regulations

Assembly Bill 1493 requires the ARB to "develop and adopt, by January 1, 2005, regulations, effective January 1, 2006, that achieve maximum feasible and cost-effective reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks" and other noncommercial personal vehicles, beginning in 2009. This landmark bill recognizes the importance of mitigating climate change by limiting emissions of greenhouse gases from motor vehicles. Cars and trucks account for over 40 percent of CO2 emissions in California. The control and mitigation of climate change will have substantial positive economic impacts on California in many areas such as public health, water supply, agricultural productivity, environmental degradation, and catastrophic natural disasters.

The bill also requires that climate change regulations must consider the impacts on the economy of the state. The consideration should include, but not be limited to, the impacts of the regulations on the creation, elimination, and expansion of jobs and businesses, California business competitiveness. The regulations must take into account the impacts on local communities with minority populations or low-income populations, and California automobile workers and affiliated businesses.

This technical document discusses the economic methodology and impacts we anticipate from implementation of the proposed climate change regulations on the California economy. The results are intended to provide an overall picture of the economic impacts of the proposed regulations on the economy. We recognize that individual businesses and consumers may experience different impacts than anticipated.

This document also presents economic impacts on households in communities that are significantly exposed to air contaminants, also known as environmental justice communities.

1. Legal Requirements

The legal requirements for economic analysis are included in California's Government Code and Health & Safety Code. This section explains the requirements that must be satisfied for economic analyses of the proposed regulations.

Section 11346.3 of the Government Code requires the State agencies to assess the potential adverse economic impacts on California business enterprises and individuals when such agencies propose to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses in other states. Many of these criteria are repeated in Health & Safety Code §43018.5(c)(2). But two criteria therein are specific to this regulation, namely, to evaluate economic impacts on the state's auto workers and

affiliated businesses and on what are often referred to as environmental justice communities.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance (DOF). The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Finally, Health and Safety Code section 57005 requires the Air Resources Board to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year.

2. Cost of Control Technologies

A comprehensive evaluation of the vehicle technology indicates that the automobile industry currently have numerous technology options to reduce climate change emissions from light-duty passenger vehicles[1]. These technologies include modifications of engine and drivetrain technologies, hybrid-electric vehicles, mobile air-conditioning system, alternative fuel vehicles, and exhaust catalyst improvement. These technologies are discussed in the main Staff Report (Initial Statement of Reasons).

Based on the implementation plan of a combination of these technologies to different vehicle classes (see Chapter 6 of the Initial Statement of Reasons, staff estimates that the proposed regulations would increase the retail prices of passenger cars (PC) and small trucks (T1) ranging from $25 to $241 and large trucks (T2) and minivans (T3) from $69 to $326 in the near term (2009-2011). The incremental retail prices of PC/T1 and T2/T3 would range from $294 to $539 and $421 to $851 in the mid term (2012-2014) respectively. The incremental retail prices for all affected vehicles would remain unchanged after 2014. The sales and the annual consumer expenditure increases to pay for the increase cost are listed in Table 1. These annual expenditures are annualized to account for the annual costs to the consumer, which is explained in the subsequent section.

[1] For a comprehensive review of "technology Assessment and its cost," please see the ARB staff report on "technology and Cost Assessment for Proposed Regulations to Reduce Vehicle Climate Change Emissions Pursuit to AB 1493," Mobile Source Control Division

Table 1. PC/T1 and T2/T3 Sales, and Cost of Control

Model	PC/T1 Vehicles			T2/T3 Vehicles		
	Sales	Average Cost	Increased Expenditures	Sales	Average Cost	Increased Expenditures
2009	1,278,614	25	31,965,350	330,469	69	22,802,361
2010	1,302,903	96	125,078,688	343,767	176	60,502,992
2011	1,282,766	241	309,146,606	344,740	326	112,385,240
2012	1,285,276	294	377,871,144	351,126	421	147,824,046
2013	1,296,618	382	495,308,076	361,633	584	211,193,672
2014	1,312,963	539	707,687,057	371,389	851	316,052,039
2015	1,331,944	539	717,917,816	381,317	851	324,500,767
2016	1,327,091	539	715,302,049	384,131	851	326,895,481
2017	1,354,192	539	729,909,488	393,942	851	335,244,642
2018	1,378,927	539	743,241,653	402,109	851	342,194,759
2019	1,400,625	539	754,936,875	407,622	851	346,886,322
2020	1,424,893	539	768,017,327	413,410	851	351,811,910
2021	1,393,349	539	751,015,111	402,458	851	342,491,758
2022	1,421,991	539	766,453,149	412,577	851	351,103,027
2023	1,445,042	539	778,877,638	417,925	851	355,654,175
2024	1,464,559	539	789,397,301	422,645	851	359,670,895
2025	1,480,373	539	765,955,697	425,586	851	362,173,686
2026	1,503,685	539	685,407,527	441,291	851	375,538,641
2027	1,534,331	539	517,857,803	463,445	851	394,391,695
2028	1,561,563	539	463,811,313	479,295	851	385,077,684
2029	1,588,719	539	361,011,465	490,922	851	357,271,630
2030	1,610,331	539	160,281,352	501,337	851	314,252,547

2.1 Annual Direct Costs to Consumers

The incremental consumer expenditures to purchase new vehicles beginning with model year 2009 and thereafter are incurred as a lump sum. Since the vehicles last for several years, the lump sum expenditure is not a cost for the year in which it was purchased. It needs to be spread over the life of the vehicle. Capital recovery method, also known as amortization method, is one way to spread the costs over life of a vehicle at a specified interest rate. The following formula is used to calculate the annualized (equivalent annual) cost of vehicle replacement:

$$AC = (ICE)(CRF)$$

Where,

AC = Annualized cost of vehicle replacement

ICE = Incremental consumer expenditure for vehicle purchase

CRF = Capital recovery factor = [i (1 + i) ^n] / [(1 + i) ^(n – 1)]

Note that "i" in the CRF formula represents the interest rate (or "opportunity cost") for the incremental consumer expenditure, while "n" represents the vehicle life, and "^" is exponent symbol. By using the capital recovery factor method, we not only account for annual depreciation expense of a vehicle but also the opportunity cost of the incremental consumer expenditures for the new vehicles.

Using the capital recovery factor method, we estimated annualized costs of the proposed regulations to consumers to be approximately $22 million in 2010, $837 million in 2020, and $1.7 billion in 2030. Table 2 provides estimates of total annual direct costs of the proposed climate change regulations to consumers from 2009 to 2030. Annual Sales Values of the vehicles were calculated by multiplying sales projection for each year by the increase in the average retail price equivalent (RPE) of vehicles in that year. The vehicle sales represents projected number of vehicles sold in that year generated from the ARB's EMFAC model. This projection is based on the assumption of the baseline scenario that vehicle prices in real terms remain flat[2].

Annualized costs to consumers are estimated using a real interest rate (opportunity cost) of 5 percent based on an average of the past ten-year interest rates on car loans and the median vehicle life of 16 years for PC/T1 and 19 years for T2/T3.

[2]For a complete description of vehicle climate change technology and cost assessment, please see "Draft Technology and Cost Assessment for Proposed Regulations to Reduce Vehicle Climate Change emissions," California Air Resources Board.

Table 2. Estimates of Total Annualized Costs of the Proposed Climate Change Regulations for 2009 through 2030 (Millions of 2003 Dollars)

Model	PC/T1	T2/T3	PC/T1 and T2/T3	Cumulative*
2009	$ 3	$ 2	$ 5	$ 5
2010	$ 12	$ 5	$ 17	$ 22
2011	$ 28	$ 9	$ 37	$ 59
2012	$ 35	$12	$ 47	$ 106
2013	$ 46	$17	$ 63	$ 169
2014	$ 65	$26	$ 91	$ 260
2015	$ 66	$27	$ 93	$ 353
2016	$ 66	$27	$ 93	$ 446
2017	$ 67	$28	$ 95	$ 541
2018	$ 69	$28	$ 97	$ 638
2019	$ 70	$29	$ 99	$ 737
2020	$ 71	$29	$ 100	$ 837
2021	$ 69	$28	$ 97	$ 934
2022	$ 71	$29	$ 100	$ 1,034
2023	$ 72	$29	$ 101	$1,135
2024	$ 73	$30	$ 103	$ 1,238
2025	$ 74	$30	$ 104	$ 1,339
2026	$ 75	$31	$ 106	$ 1,434
2027	$ 76	$33	$ 109	$ 1,514
2028	$ 78	$34	$ 112	$ 1,589
2029	$ 79	$35	$ 114	$ 1,652
2030	$ 80	$35	$ 115	$ 1,692

* Beginning 2025 the accumulation is net of vehicles that have operated for 16 years, the assumed life of a vehicle, i.e., the total annualized cost in 2025 excludes the 2009 model year annual cost for PC/T1, 2026 excludes the 2009 and 2010 costs. Beginning 2028 when T2/T3 vehicles are 19 years old, the cumulative cost is adjusted similar to PC/T1 approach.

2.2 Operating Costs

Many of the technologies that reduce climate change emissions will also have the potential to lower the operating costs of vehicles. Lifetime maintenance costs are also expected to remain the same or decline, depending on the technologies chosen by manufacturers. For example, improved containment of air conditioning refrigerant may reduce the need for mobile air conditioning servicing and therefore reduce maintenance costs to consumers. Due to a lack of comprehensive data, however, staff assumed no change in maintenance operating costs for the purpose of this analysis. Estimates of the reduction in fuel consumption of vehicles range from about 2 percent to 27 percent for PC/T1, and about 5 percent to 25 percent for T2/T3. Table 3 provides estimates of annual fuel consumption savings from 2009 through 2030. Data on fuel consumption are generated from the EMFAC model. Fuel prices adjusted for inflation are derived

from the 2004 California Energy Commission (CEC) Integrated Energy Policy Report[3]. The value of fuel consumption savings is estimated by multiplying annual reduction in fuel consumption by a gasoline price of $1.74 per gallon. This represents the total direct savings to consumers.

Table 3. Estimates of Total Annual Value of Vehicle Fuel Consumption Savings

Model Year	Annual Fuel Consumption Savings for PC/T1 (Millions of gallons)	Annual Fuel Consumption Savings for T2/T3 (Millions of gallons)	Annual Value of Fuel Consumption savings (Millions of 2003 dollars)
2009	20	17	$ 64
2010	100	59	$ 276
2011	294	135	$ 747
2012	500	212	$1,239
2013	721	292	$1,762
2014	964	375	$2,331
2015	1,199	457	$2,881
2016	1,421	536	$3,405
2017	1,635	614	$3,913
2018	1,840	689	$4,402
2019	2,038	763	$4,872
2020	2,226	833	$5,324
2021	2,413	904	$5,771
2022	2,575	967	$6,164
2023	2,729	1,028	$6,537
2024	2,874	1,085	$6,890
2025	3,008	1,140	$7,218
2026	3,166	1,209	$7,612
2027	3,287	1,266	$7,922
2028	3,401	1,323	$8,220
2029	3,510	1,379	$8,508
2030	3,616	1,433	$8,785

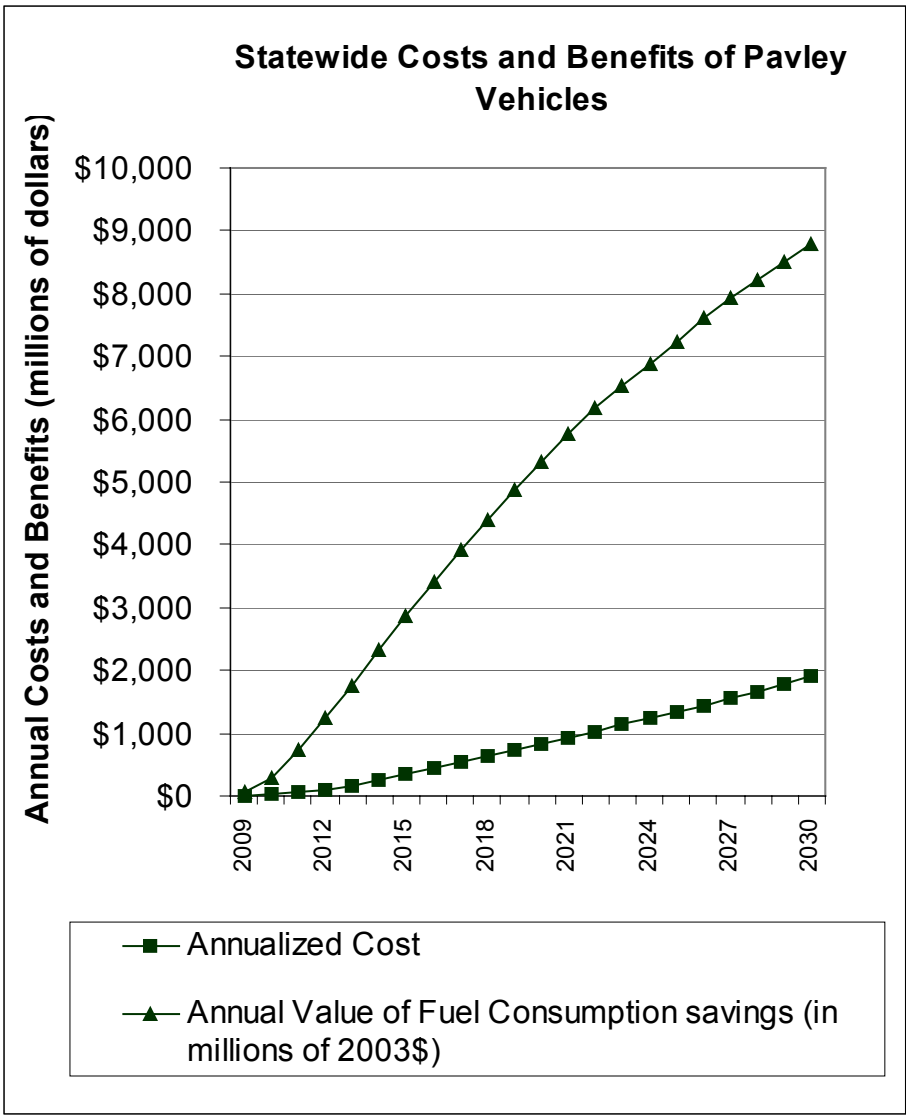
3. Statewide Costs and Benefits

Overall, purchasers of vehicles in model year 2009 and thereafter vehicles would experience a significant reduction in their fuel consumption. As shown in Figure 1, the annual value of the fuel savings is expected to exceed the annual cost increase to consumers for new vehicles by a ratio of about 13 to 1 in 2010 ($276 million savings

[3] California Energy Commission, Integrated Energy policy Report, Fuel Division, 2004.

over $22 million in costs), over 6 to 1 in 2020 ($5,324 million over $837 million), and about 5 to 1 in 2030 ($8,785 million over $1,692 million).

Figure 1. Statewide costs and Benefits of the Proposed Climate Change Regulations



4. Impacts on the California Economy

Higher vehicle prices provide a means to estimate the direct expenditures that will be incurred by California businesses, governments, and individuals to meet the requirements of the proposed climate change regulations. These expenditures would in turn bring about additional (indirect) changes in the California economy that may

change the overall costs of the regulation to the economy. Increased vehicle prices, for example, may result in a reduction of demand for other goods and services as consumers use more of their money to pay for the price increase. California firms may respond by cutting back production and decreasing employment. On the other hand, in response to the proposed regulations automobile manufacturers are expected to choose technologies that reduce vehicle operating costs, leaving consumers with additional money to spend on products and services. This would, in turn, induce firms supplying those products and services to expand their production and increase their hiring of workers. A third type of effect occurs when purchase of the new vehicles directly lowers demand for the petroleum refining and gasoline distribution sectors.

The changes caused by the proposed regulations will affect industries both negatively and positively. The net effect on the California economy of these activities hinges on the extent to which products and services are obtained locally. Using the E-DRAM model, staff estimated the net effects of these activities on affected industries and the overall economy. The California industries and individuals affected most by the proposed climate change regulations are those engaged in the production, distribution, sales, service, and use of light-duty passenger vehicles.

The economic model, however, does not account for the environmental improvement benefits to California businesses and citizens that the climate change regulations will bring. We believe that California actions to reduce climate change emissions, especially if followed by other states and nations, will diminish the potential of consequences from global warming in many areas such as public health, water supply, agricultural productivity, environmental degradation, and catastrophic natural disasters.

4.1 Environmental-Dynamic Revenue Analysis Model

The overall impact of all direct and indirect economic effects that may result from potential regulations developed under AB 1493 will be estimated using a computable general equilibrium (CGE) model of the California economy. A CGE model simulates various economic relationships in a market economy where prices and production adjust in response to changes caused by regulations to establish the equilibrium in markets for all goods and services and factor of production (i.e., labor and capital).

The CGE model that will be used for this analysis is a modified version of the California Department of Finance's Dynamic Revenue Analysis Model (DRAM).[4] The new modified model is called Environmental-DRAM (E-DRAM).[5] E-DRAM describes the relationships among California producers, California consumers, government, and the rest of the world. Changes to the model enable it to assess the economic impacts of

[4] For a complete description of DRAM, see Peter Berck, E. Golan and B. Smith, "Dynamic Revenue Analysis for California", California Department of Finance, Summer 1996.
[5] Berck, Peter, "Developing a Methodology for Assessing the Economic Impacts of Large Scale Environmental Regulations", Prepared for California Air Resources Board, February 2000.

large-scale environmental regulations. The economic impact results will be estimated in terms of changes in the State output, personal income, and employment.

As stated above, E-DRAM is an extended version of DRAM and contains additional detail about the California economy. The current version of the model consists of over 1,000 equations designed to capture the interactions between over 100 industrial sectors, 2 factor sectors (labor and capital), 9 consumer good sectors, 7 household sectors (classified by income level), 1 investment sector, and 45 government sectors (8 federal, 21 State, and 8 local), and the rest of the world.

Data for the industrial sectors originated with the Bureau of Economic Analysis of the U.S. Department of Commerce, based on the Census of Business – a detailed survey of companies conducted in the U.S. every five years. The conversion of national data to updated California data is accomplished by Impact Analysis for Planning (IMPLAN), a program that primarily utilizes state-level employment data to scale national-level industrial data down to the size of a state.

In much the same way as firms, households are also aggregated. California households were divided into categories based upon their taxable income. There are seven such categories in the model, each one corresponding to a California personal income tax marginal tax rate (0, 1, 2, 4, 6, 8, and 9.3 percent). Thus, the income for the "one-percent" household is calculated by adding up the income from all households in the one-percent bracket.

Similarly, the expenditure of the one-percent household on agricultural goods is calculated by adding up all expenditures on agricultural goods for these households. The total expenditure on agricultural goods is found by adding the expenditure of all households together.

Firms and households relate through factor markets and goods-and-services markets. Firms sell goods and services to households on the good-and services markets. Households sell labor and capital services to firms on the factor markets. There is a price in each of factor and goods-and services markets. Equilibrium in the factor markets and the goods-and-services markets means that prices adjust in response to changes caused by regulations to equate quantities supplied and demanded in all markets.

4.2 Overall Economic Impact

Higher vehicle prices associated with the proposed regulations would affect the California economy through many complex interactions. E-DRAM was developed to simulate many of these complex interactions. Using the model, ARB staff in consultation with UC Berkeley researchers conducted an assessment of the economic impacts of the proposed regulations on the California economy.

The changes resulting from the proposed regulations are inputted into E-DRAM based on the information provided by the California Energy Commission (CEC)[6]. According to the CEC, consumers account for roughly 90 percent of gasoline consumption in the State while the industries account for the remaining balance. Hence, 90 percent of estimated increases in vehicle prices and the corresponding portion of projected fuel savings are apportioned to household and the remaining 10 percent to industries. In the E-DRAM model, the cost of consumer transportation was increased by 90 percent of estimated increases in vehicle prices and the consumer expenditures on fuel was reduced by 90 percent of the projected fuel savings. The remaining changes in costs and savings associated with the proposed regulations were attributed to the industrial engine sector.

Table 4, 5, and 6 summarize the impacts of the proposed climate change regulations on the California economy for fiscal years 2010, 2020 and 2030. Since the current E-DRAM model is built to reproduce the economic conditions of fiscal year 1998/99, we first extrapolated the model out to 2010, 2020, and 2030 based on State population, personal income, and industry-specific forecasts[7]. Higher vehicle prices were then adjusted to fiscal year 2010, 2020 and 2030. All prices are stated in 2003 dollars.

The results of the E-DRAM simulation show that the changes caused by the proposed regulations would reduce the California economic output by roughly $90 million (0.004 percent) in 2010, $2.6 billion (0.08 percent) in 2020, and $4.7 billion (0.1 percent) in 2030. Personal income, however, would increase by roughly $480 million (0.03 percent) in 2010, $5.4 billion (0.3 percent) in 2020, and $7.7 billion (0.3 percent) in 2030. As a result, California net employment would also increase by over 8,000 jobs (0.5 percent) in 2010, 57,000 (0.3 percent) in 2020, and 76,000 (0.4 percent) in 2030.

Table 4. Economic Impacts of the Proposed Climate Change Regulations on the California Economy in Fiscal Year 2010

California Economy	Without Climate Change Regulations	With Climate Change Regulations	Difference	% Total
Output (Billions)	$2,228.06	$2,227.97	- $0.09	- 0.004
Personal Income (Billions)	$1,451.01	$1,451.49	+ $0.48	+ 0.03
Employment (thousands)	16,354	16,362	+ 8	+ 0.05

[6]

[7] For a more detail description of the E-DRAM extrapolation to "out years", please see "Benefits of Reducing Demand for Gasoline and Diesel," a joint report to California Air Resources Board and California Energy Commission prepared by Arthur D. Little, Inc., March, 2002.

Table 5. Economic Impacts of the Proposed Climate Change Regulations on the California Economy in Fiscal Year 2020

California Economy	Without Climate Change Regulations	With Climate Change Regulations	Difference	% Total
Output (Billions)	$3,078.02	$3,075.44	- $2.58	- 0.08
Personal Income (Billions)	$2,009.54	$2,014.92	+ $5.38	+ 0.3
Employment (thousands)	18,661	18,718	+ 57	+ 0.3

Table 6. Economic Impacts of the Proposed Climate Change Regulations on the California Economy in Fiscal Year 2030

California Economy	Without Climate Change Regulations	With Climate Change Regulations	Difference	% Total
Output (Billions)	$4,241.54	$4,236.83	- $4.71	- 0.1
Personal Income (Billions)	$2,781.44	$2,789.14	+ $7.71	+ 0.3
Employment (thousands)	21,763	21,839	+ 76	+ 0.4

These results indicate that higher vehicle prices cause consumers to redirect their expenditures. Consumers would now spend more on the purchase of motor vehicles, thus have less money to spend on the purchase of other goods and services. Since most auto manufacturing occurs outside of the State, the increased consumer expenditures on motor vehicles would be a drain on the California economy. However, the reduction in fuel consumption that results from improved vehicle technology would reduce consumer's expenditures on fuel and would leave California consumers with more disposable income to spend on other goods and services. Businesses that serve local markets are most likely to benefit more from the increase in consumer's expenditures. The increase would in turn boost the California economy, resulting in creation of additional jobs.

4.3 Conclusion

Total annual direct costs associated with the proposed climate change regulations are estimated to be approximately $20 million in 2010, increasing to $837 million in 2020, and $1.7 billion in 2030. Concurrently, consumer's purchasing power from reduced fuel consumption is projected to increase from approximately $280 million in 2010, to over $5.3 billion in 2020, and $8.8 billion in 2030. Accounting for indirect impacts of these changes, the proposed regulations would be expected to reduce California economic output by roughly $90 million in 2010, $2.6 billion in 2020, and $4.7 billion in 2030. The proposed regulations, however, would increase personal income by roughly $480 million in 2010, $5.4 billion in 2020, and $7.7 billion in 2030. As a result, the proposed

regulations are projected to boost employment by about 8,000 jobs in 2010, 57,000 in 2020, and 76,000 in 2030. In the context of the State's economy, the economic impacts of the proposed regulations are small and are not expected to impose a noticeable impact on the California economy. However, the proposed regulations are expected to bring substantial economic benefits to Californians in many areas such as public health, water supply, agricultural productivity, environmental degradation, and catastrophic natural disasters. These benefits, which are difficult to quantify, are not included in this analysis. Overall, implementation of the proposed regulations would be expected to improve the well-being of Californians.

5. Potential Impact on a Typical Low-income Household

The proposed climate change regulation is likely to require changes in vehicle technology that could increase the price of new (model year 2009 and thereafter) vehicles sold in California. This increase in turn is expected to increase the price of used vehicles. These changes have the potential to adversely affect low-income purchasers of used vehicles. Although the improvement in vehicle technology is expected to lower the fuel usage of new vehicles beginning with model year 2009, these vehicles will not be available in the segment of the used car market that is most attractive to low-income purchasers. According to the 2001 National Household Travel Survey, low-income households with an average annual income of $20,000 tend to purchase vehicles with an average age of 10 to 12 years[8]. Thus, it is not expected that low-income households will be able to purchase Pavley vehicles for sometimes to come.

5.1 Approach

The study approach used to assess the potential impact of the proposed regulations on typical low-income purchasers of used vehicles is outlined as follows:

(1) Changes in prices of used vehicles caused by the proposed regulations for typical small and large vehicles were estimated, using historical retention value for various vehicles and trucks. For example, a $500 increase in the price of a small new vehicle is expected to increase the price of a 10-year-old vehicle by $80 assuming a retention value of 16 percent.

(2) Changes in prices of used vehicles were annualized over the remaining life of vehicles. For example, an $80 increase in the price of a 10-year-old small used vehicle is equivalent to a $16 annual cost increase of the vehicle over its remaining life of 6 years.

[8] 2001 National Household Travel Survey, the U.S. Department of Transportation, http://nhts.ornl.gov/2001/html_files/introduction.shtml

(3) Annualized cost increase was compared with median income of typical low-income households to assess the extent of the impact on typical low-income household purchasers of used vehicles.

5.2 Assumptions

The following assumptions were used to estimate the potential economic impacts of the proposed regulations on typical low-income households:

(1) The proposed regulations would increase the average price of a new small vehicle and truck by about $540 and the average price of a new large vehicle, truck and minivan by $850.

(2) Most low-income households purchase vehicles that are at least 10 years old. This assumption is based on the information obtained from the 2001 National Household Travel Survey.

(3) 10-year-old used small vehicles and trucks have retention values of about 16 and 27 percent respectively. 10-year-old large vehicles, trucks and minivans have retention values of about 25, 29 and 27 percent respectively. This information is generated from the depreciation schedule used by the CABITIS model.

(4) Real discount rate of 10 percent was used for this analysis. The inflation adjusted interest rate on car loans was about 5 percent in the past 10 years was [9]. A 5 percent risk premium was added to the historical car loan rate to reflect higher risk associated with financing used vehicle and lending to low-income households.

(5) New small or large vehicles are expected to have the median useful life of 16 years, and new small and large trucks and minivan have the median useful life of 19 years[10]. Based on the data from EMFAC, a 10-year-old car has a median remaining useful life of 8 years and a 10-year-old truck with a median remaining useful life of 11 years.

(6) California households of three with the annual family income of $15,000 or less are considered to be economically disadvantaged[11].

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[9] Historical car loan data, Federal Reserve Statistical release,
http://www.federalreserve.gov/releases/g19/hist/cc_hist_tc.html
Historical Consumer Price Index, U.S. Department of Labor, Bureau of Labor Statistics,
http://research.stlouisfed.org/fred2/data/CPIAUCNS.txt

[10] Please see "Draft Technology and Cost Assessment for Proposed Regulations to Reduce Vehicle Climate change Emissions Pursuit to AB 1493," Air Resources Board.

[11] U.S. Department of Labor and U.S. Department of Health and Human Services

(7) Low-income households do not experience savings from reduction in fuel consumption at least in the first 10 years of the proposed regulations.

5.3 Results

Typical California low-income households are affected by the proposed climate change regulations to the extent that the implementation of the regulations would alter their annual income. Using the above assumptions, staff estimated that the increase in annual costs of used vehicle ranges from 0.09 to 0.2 percent of the annual family income of $15,000 for a low-income household, as shown in Table 7. This represents a minor change in the average income of typical low-income households.

Table 7. Potential Impacts on Low-Income Households

Description	Small Car	Large Car	Small Truck	Large Truck	Minivan
Increase in New Car Prices	$540	$850	$540	$850	$850
Increase in Used Car Value	$86	$213	$146	$247	$230
Median Remaining useful life (years)	8	8	11	11	11
Annualized Cost	$13	$33	$18	$30	$28
Poverty Income Level	$15,000	$15,000	$15,000	$15,000	$15,000
% Change	**0.1**	**0.2**	**0.1**	**0.2**	**0.2**

The above analysis assumes that low-income households would be able to finance the increase in used car prices either from their own income or from borrowing. As shown in the following table, the increase in used car prices range from $86 for a small passenger car to $247 for a large truck. It is, thus, possible that some low-income households might have difficulty to raise additional money to purchase their vehicles. We believe this case is highly unlikely because about 70 percent of vehicles owned by households with family income of less than $15,000 is passenger cars[12]. These households are likely to replace their vehicles with similar vehicles. Therefore, the additional costs of used cars to most low-income households would be about $86. This amounts to about 0.1 percent of their annual income.

[12] 2001 National Household Travel Survey.